



University of Maine Cooperative Extension

Storage of Large Round Bales

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In order to make hay harvesting more labor efficient, the trend has been towards the use of large round balers. And with the capability of most of them now to make wet hay into round bales, their use has helped to spread the investment in equipment over more tonnage. Much of the same equipment can now be used for both silage and dry hay.

The potential losses that occur when round bales are stored as dry hay or silage should be a concern to all producers. Let's take a closer look at potential losses for each storage method.

Dry Hay

Hay packaged in round bales has been stored by a variety of methods. Some of them include:

- a. *Outdoors on the ground, uncovered.*
- b. *Off the ground on crushed stone, pallets, or old tires.*
- c. *Under individual plastic caps.*
- d. *In individual plastic sleeves.*
- e. *Stacked outside and covered with plastic or tarp.*
- f. *Undercover in a building.*

It is well known that there are substantial losses from round bales stored outside on the ground. This would especially be true for the typical environmental conditions here in Maine. Researchers at Tennessee reported on the losses which can occur when round bales are stored in various fashions. Some of their results are reported in Table 1.

Table 1. Dry matter losses associated with storage method and amount remaining for feeding.*

Parameter	Stored Inside	Stored Outside	
		Covered**	Exposed***
Number of bales	20	10	10
Avg. wt. of bales (lb.)			
at baling	1291	1280	1261
at feeding	1170	1195	1173
Dry matter (%)			
at baling	84.4	84.7	85.3
at feeding			
shell (8")	83.8	84.4	54.9
core	86.1	87.1	83.9
Losses			
storage (% baled)	8.0	5.0	17.9
refusal and waste (% baled)	5.5	6.6	17.1
Dry matter utilization,			
% of d.m. at baling	86.5	88.4	65.0

* from Baxter et al, 1986, J. Dairy Science 69:1854.

** bales on tires and covered with plastic caps.

*** bales on the ground and not covered.

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As shown by the data in Table 1, only 65% of the dry matter at baling was available from bales stored outside on the ground. If bales are left on the ground for a short time while they are heating, only minimal losses will likely occur. It's when large round bales are left out for extended periods that substantial storage losses occur. It's been calculated that approximately 25% of the hay in a round bale is in the outer 4-5 inches. If most of that layer is discarded, a major storage loss results.

For the research study reported in Table 1, dry matter recoveries from bales stored outside with plastic caps were essentially the same as for bales stored indoors. A recent study from Virginia reported that storage of round bales in sleeves increased recoveries of dry matter and crude protein by 12% and 9% respectively, compared to bales stored in contact with soil. If large, round bales of hay cannot be stored indoors, it would appear that covering them with plastic sleeves or plastic caps while stored outdoors markedly reduces storage losses.

Silage

Round balers are now constructed so as to bale haycrop forage that is quite wet (60-70% moisture). This type of forage is much more dense than dry hay, so a 1000 lb. bale is not very large. Putting this forage in an air-tight container immediately after baling will allow an ensiling process to occur. Round bale silage has been made in a number of containers such as:

- a. *Stacks of bales covered tightly with plastic.*
- b. *Individual plastic bags.*
- c. *Long plastic tubes.*
- d. *Individually wrapped in plastic.*

Some of the original attempts to make round bale silage were done by stacking bales tightly together and covering them securely with plastic. This system is not very conducive to getting the bales covered immediately after baling, a must for insuring proper fermentation. Furthermore, any accidental holes in the cover over the stack could lead to spoilage in many bales, not just one.

Because of these problems, the next trend was to put round bales in individual large plastic bags. The bagging process is fairly labor intensive, normally with 2-3 people involved. The bales need to be small enough so that they can be slipped into the bags easily without puncturing the bag. Once tied shut, the amount of air left in the bags in comparison to the total surface area of the bale is large enough to raise concerns about aerobic fermentation. Aerobic fermentation can lead to the growth of molds and the bacteria which cause listeriosis.

A third method of making round bale silage is to stuff a number of bales (up to 40-45) into long plastic tubes like those used for chopped haylage. A special piece of machinery is used to stuff the bales into a tube, but the job can usually be accomplished by one person. Unlike individual bags, a puncture wound in the plastic tube can result in spoilage of more than one bale.

Finally, the most common technique for making round bale silage now is to wrap bales individually with stretch plastic. This process requires a special piece of equipment. To justify the cost of a bale wrapper, a fairly large number (at least 100) of bales should be wrapped per year.

The plastic should be stretched about 50% to get the right tension and wrapped two times to provide four layers per bale (a 50% overlap). It is best to use plastic with a tackiness agent for proper sealing and a UV inhibitor which protects the plastic from damaging sunlight. Because the preservatives in sisal twine may degrade the plastic wrapping, the bales should be tied with plastic twine or mesh. Rodent damage can be reduced by storing wrapped bales on a sheet of plastic or a clear gravel area. A grassy area will provide cover for rodents.